

LAC-USC BURN CENTER

INTRA-ABDOMINAL PRESSURE (IAP) MEASUREMENT

Purpose: To help recognize and intervene early for elevation of intra-abdominal pressure (IAP) before complications can occur such as:

- abdominal compartment syndrome,
- impaired pulmonary function,
- renal impairment,
- GI dysfunction
- Hemodynamic instability

Pressure monitoring can also provide direction in medical/surgical management of intra-abdominal hypertension (IAH).

Classification:

IAP	Definition
0 - 5 mmHg	Normal
5 - 10 mmHg	Common in critically ill patients
12+ mmHg	IAH (intra-abdominal hypertension)
15- 20 mmHg	Dangerous IAH
>20 mmHg	ACS (with new or progressive organ failure)

Indication for IAP Monitoring

1. IAP measurements will be initiated upon and during admission to the Burn ICU for:
 - a. Patients with a TBSA of 20% or greater
Patients with a TBSA of 10% or greater with inhalation injury
 - b. Patients **with two or more risk factors** for IAH/ACS*
 - c. Patients with new or progressive organ failure
 - d. Patients with the following signs:
 - 1) Abdominal distention and NGT feeding intolerance (high residual volumes)
 - 2) Decreased pulmonary compliance (e.g. elevated peak inspiratory pressures)
 - e. Patients with the following signs of **new or unexplained**:
 - 1) Oliguria
 - 2) Hypotension and decreased cardiac output
 - 3) Acidosis
 - 4) Increased central venous pressures (CVP)

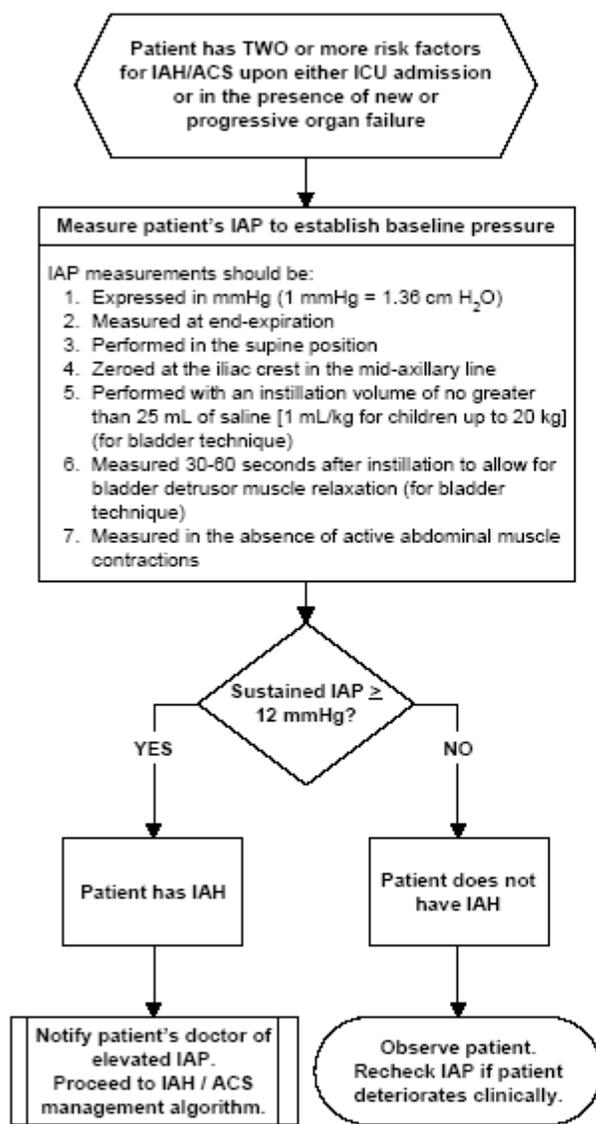
Assessment/Management

1. IAP's will be measured Q4h while patient is receiving the Parkland formula (4cc/kg x %TBSA) **OR** receiving higher than predicted fluid resuscitation amounts in 48 hours
2. IAP's will be measured q2h if IAP \geq 12mmHg.
4. Set up continuous IAP monitoring when IAP \geq 15mmHg
3. Notify Physician of IAP \geq 12 mmHg.
4. Discontinue IAP measurements when pressure <12mmHg on two consecutive readings (need MD order). Monitor for signs and symptoms of intra-abdominal hypertension.

**Review INTRA-ABDOMINAL HYPERTENSION (IAH) ASSESSMENT ALGORITHM from the World Society of ACS*

INTRA-ABDOMINAL HYPERTENSION (IAH) ASSESSMENT ALGORITHM

- Patients should be screened for IAH/ACS risk factors upon ICU admission and with new or progressive organ failure.
- If two or more risk factors are present, a baseline IAP measurement should be obtained.
- If IAH is present, serial IAP measurements should be performed throughout the patient's critical illness.



- Risk Factors for IAH / ACS**
1. Diminished abdominal wall compliance
 - Acute respiratory failure, especially with elevated intrathoracic pressure
 - Abdominal surgery with primary fascial or tight closure
 - Major trauma / burns
 - Prone positioning, head of bed > 30 degrees
 - High body mass index (BMI), central obesity
 2. Increased intra-luminal contents
 - Gastroparesis
 - Ileus
 - Colonic pseudo-obstruction
 3. Increased abdominal contents
 - Hemoperitoneum / pneumoperitoneum
 - Ascites / liver dysfunction
 4. Capillary leak / fluid resuscitation
 - Acidosis (pH < 7.2)
 - Hypotension
 - Hypothermia (core temperature < 33°C)
 - Polytransfusion (>10 units of blood / 24 hrs)
 - Coagulopathy (platelets < 55000 / mm³ OR prothrombin time (PT) > 15 seconds OR partial thromboplastin time (PTT) > 2 times normal OR international standardised ratio (INR) > 1.5)
 - Massive fluid resuscitation (> 5 L / 24 hours)
 - Pancreatitis
 - Oliguria
 - Sepsis
 - Major trauma / burns
 - Damage control laparotomy

IAH Grading

Grade I	IAP 12-15 mmHg
Grade II	IAP 16-20 mmHg
Grade III	IAP 21-25 mmHg
Grade IV	IAP \geq 25 mmHg

Abbreviations

IAH	- Intra-abdominal hypertension
ACS	- abdominal compartment syndrome
IAP	- Intra-abdominal pressure

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Continuous Bladder Pressure Monitoring Procedure

Equipment:

Three-way Foley
Foley drainage tubing and meter
IV pole with transducer holder
CVP transducer set up
Pressure bag
500cc normal saline IV (flush) solution
Lopez Valve

Procedure Steps

1. Insert three-way Foley and attach Lopez valve to irrigation port.
2. Open CVP transducer kit and remove pressure tubing from stopcock closest to transducer.
3. Attach one end of short pressure tubing to female end of stopcock and attach other end to Lopez Valve. Discard long pressure tubing
4. Spike the IV flush solution and flush pressure tubing, stop cock, and Lopez valve ensuring line is free from air/air bubbles.
5. Place IV flush solution in pressure bag and maintain pressure at ~200mHg (green shaded area).
6. Connect transducer cable to end of transducer
7. Level to the **mid-axillary line at the iliac crest.**
 - Upon assuming care and a minimum of every 12 hours.
 - With every change in patient position
 - To verify accuracy of any questionable values
8. Secure transducer to patient at mid-axillary line at the iliac crest with tape
9. Zero transducer
 - Upon assuming care and a minimum of every 12 hours
 - To verify accuracy of any questionable values
10. Set label on monitor as ICP

Key Points

Ensure aseptic technique
Ensure open end of Lopez valve is kept sterile.

Ensure aseptic technique

To ensure accuracy of IAP values

To ensure accuracy of IAP values

This allows abdominal perfusion pressure (APP) to be monitored.
 $(MAP-ICP) = APP$
(IAP)

11. Set pressure range at 30mmHg on monitor

12. Place the patient supine

Patient must be supine with HOB flat. HOB elevation falsely increases IAP by compressing the bladder with pressure from abdominal/intrathoracic contents.

13. Verify pressure waveform and value on monitor.

14. Ensure patient is not actively contracting his abdomen.

To ensure accuracy of IAP values. Actively contracting abdomen and "fighting" the ventilation and give false high IAP values.

15. Document bladder pressure and patient position on vital signs page in Eclipses

To maintain consistency in recording accurate IAP values.

16. Notify MD when IAP \geq 12mmHg

Patient has IAH.

16. Place patient back in 30° position

17. Monitor bladder pressure and waveform continuously.

IAP values will read higher when patient not in supine position. Use IAP values as "trend".

18. Change as follows: (flush bag, tubing, Lopez valve)

- Flush solution every 96 hours, with catheter change, and as needed.
- Pressure tubing, transducer, and Lopez valve every 96 hours and with catheter change
- Tape – as needed

19. Verify the following:

- Alarms are on and parameters set
- Catheter is secure
- All ports are covered with non-vented caps



3-way Foley with continuous bladder pressure monitoring

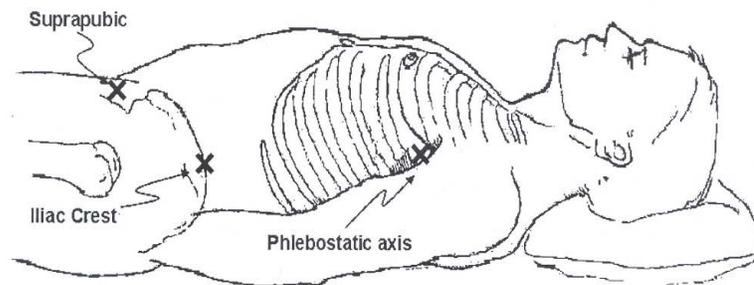
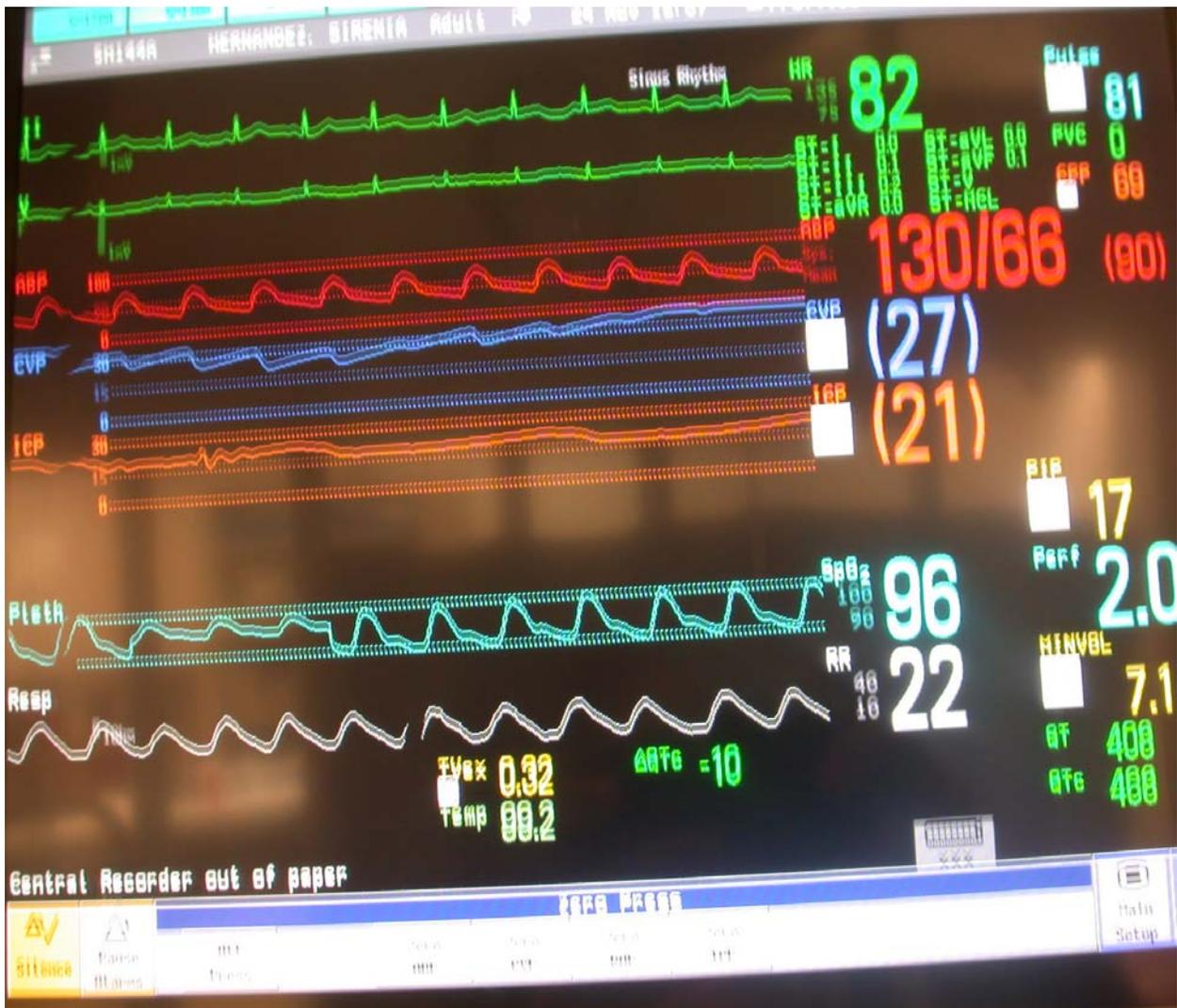


Figure 1. Localization of the different reference levels used. (World Society of Abdominal Compartment Syndrome).



Transducer position at mid-axillary line at the iliac crest



Bladder pressure measurement with ICP Label